

Korean Language Proficiency, Duration of Residence and Self-reported Hypertension among Foreign-born Populations in Korea

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KEYWORDS Acculturation. Body Mass Index. Duration of Stay. Immigrants. Language

ABSTRACT Acculturation is the process of adaptation to the traditions, values and practices of a host country. The purpose of this study was to explore the relationship between Korean language proficiency, duration of residence and self-reported hypertension among foreign-born populations in Korea. Using logistic regression, acculturation variables, socio-demographic and self-reported hypertension were correlated. Korean language proficiency was not associated with hypertension (OR=0.721). However, duration of residence in Korea (over 5 years, OR=1.789), age (40-49 years, OR=3.751), obesity (BMI $\geq$ 25kg/m², OR=2.679) and family history of hypertension (OR=4.42) were associated with hypertension. Gauging the impact of duration of residence on hypertension, many confounding factors such as genetics, nutrition, social and economic situation of individuals in relation to hypertension can be involved. Future research should focus on acculturation and health status among specific ethnic groups to reduce the prevalence of hypertension.

INTRODUCTION

Hypertension, also known as high blood pressure (HBP) or arterial hypertension is a chronic medical condition in which the blood pressure in the arteries is elevated (Hamrahian 2017). Worldwide, approximately 1 billion individuals had HBP in 2000 and the number is predicted to increase to about 1.5 billion by 2025 (He et al. 2012). In Korea, researchers investigated the incidence of hypertension over a 5-year period and estimated that the age-adjusted 5-year incidence rates of hypertension were 22.9 percent in overall subjects (Lee et al. 2011). Until very recently, Korea has had little or no experience with large-volume immigration (Kim et al. 2014). As these foreign-born populations arrive in the country, they experience acculturation and consequently the risk of developing hypertension (Commodore-Mensah et al. 2017; Deo et al. 2017; Lamar et al. 2017).

Acculturation is the process of adaptation to the traditions, values and practices of a host

country (Obiang-Obounou 2015). Studies have shown that acculturation is associated with the risk of hypertension (Jin et al. 2017; Moran et al. 2007; Rodriguez et al. 2012). As people migrate in search of work, the attendant lifestyle changes become a major predisposition factor for developing cardiovascular diseases (Jin et al. 2017; Rosenthal 2014). While a standard acculturation process is not fully agreed upon (Alegria 2009), researchers' measures of acculturation have generally included host country language proficiency, duration of residence, place of birth (region of origin), and age at migration (Eamranond et al. 2009; Wilkinson et al. 2005).

Previous researchers suggested that place of birth, language barriers, and duration of residence are associated with higher prevalence of hypertension (Commodore-Mensah et al. 2017; Eamranond et al. 2009; Rodriguez et al. 2012). The researcher postulated a similar finding for Korea. However, these researches have mainly focused on the acculturation of Hispanic, European, and Asian immigrants in Western societies (Kim et al. 2014; Moon et al. 2014). No report was published on the relationship between acculturation and self-reported hypertension among immigrants in the Republic of Korea (Korea).

The objective of this research is to investigate the association between Korean language proficiency, duration of residence in Korea and

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self-reported hypertension. The researcher also analyzed body mass index (BMI), gender, age, and parental hypertension as control variables.

METHODOLOGY

Study Population and Sample

A cross-sectional survey was carried out between August and December 2014 among the foreign-born population in Korea. Participants were selected through population-based approaches. In order to have the maximum number of foreigners for the study, posters were placed in public coffee shops, universities and foreigners social groups (that is, Facebook). Before the participants answered the questionnaire, they received information from the researcher about the survey, including its purpose, procedures, and confidentiality. The criteria for inclusion were: foreign-born, age 18 and over and residing in Korea. Exclusion criteria included age under 18, participants residing outside of Korea, Koreans and pregnant women.

Demographic Variables

Demographic variables included age, sex, education level (high school, bachelor's degree or post-graduate), marital status and occupation. Two variables were used as proxies for acculturation: Korean language proficiency and number of years residing in Korea. Prior studies have found language proficiency and length of stay in a country to be valid and reliable proxies of acculturation (Moran et al. 2007; Rodriguez et al. 2012). Korean language proficiency was assessed by the question: "How well do you speak Korean?" The Korean Ministry of Education, Science and Technology grouped Korean language proficiency in three groups (beginner, intermediate and advanced) classified in six categories (Unknown 2016). Self-reported Korean language proficiency was dichotomized into: Not well/not at all, well and very well. The duration of residence in Korea was assessed by the question: "How long have you been living in Korea?" (Satia-Abouta 2003). Responses were categorized as a three level variable (<1 year, 1-4 years, ≥ 5 years) (Okafor et al. 2013). Self-reported hypertension was ascertained as previously published (Rodriguez et al. 2012) by the question: "Has a doctor ever told you that you have

high blood pressure?" Body mass index was calculated based on the participant's self-reported weight and height as weight in kilograms divided by height in meters squared (kg/m^2). The World Health Organization (WHO) has recommended classifications of bodyweight that include degrees of underweight and gradations of excess weight or overweight that are associated with increased risk of some non-communicable chronic diseases (WHO Expert Committee on Physical Status: The Use and Interpretation of Anthropometry 1995; World Health Organization 2000). The normal range for an adult BMI is 18.5-24.9; an adult with a BMI ranging from 25 to 29.9 is considered overweight whereas an adult with a BMI greater than or equal to 30 is considered obese (Nguyen et al. 2015).

Human Subjects Research Approval

The study was conducted in accordance with the Declaration of Helsinki. The protocol was approved by the Institutional Review Board (IRB) of Keimyung University (IRB file number: 40525-201410-HR-71-02).

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 21.0 (Armonk, NY). Univariate analyses were used to generate descriptive statistics and the Chi-square test was employed to compare the distribution of demographic variables and self-reported hypertension. The researcher used bivariate and multivariate analyses to determine the association between region of origin and self-reported hypertension for demographic variables, socio-economic status and degree of acculturation measured by Korean language proficiency and the number of years of residence in Korea. All p values reported are for 2-tailed tests and a value of $p < 0.05$ was considered statistically significant. Reported odds ratios are based on the final logistic regression model. The researcher included region of origin, age, BMI, gender and parental hypertension in our final multivariable model (Table 4).

RESULTS

Univariate Analyses

There were 914 self-identified foreign-born participants (Table 1). Total participants includ-

Table 1: Socio-demographic and physical characteristics of participants

Variables	Total samples (N=914) n (%)	Africa (n=236) n (%)	Asia (n=140) n (%)	Australia (n=27) n (%)	Middle East (n=23) n (%)	Europe (n=125) n (%)	North America (n=333) n (%)	South America (n=30) n (%)
Gender								
Female	466 (51.0%)	101 (42.8%)	71 (50.7%)	10 (37.0%)	7 (30.4%)	62 (49.6%)	198 (59.5%)	17 (56.7%)
Male	448 (49.0%)	135 (57.2%)	69 (49.3%)	17 (63.0%)	16 (69.6%)	63 (50.4%)	135 (40.5%)	13 (43.3%)
Age (years)								
Mean (SD)	29.84 (7.98)	26.80 (5.41)	26.99 (6.31)	38.04 (10.85)	27.09 (4.19)	29.38 (6.78)	33.13 (8.84)	27.13 (7.29)
Range	18-68	18-57	19-60	18-57	21-35	19-51	20-68	18-48
Education								
High School	62 (6.8%)	22 (9.3%)	11 (7.9%)	1 (3.7%)	1 (4.3%)	10 (8.0%)	11 (3.3%)	6 (20.0%)
Bachelor	490 (53.6%)	148 (62.7%)	67 (47.9%)	17 (63.0%)	10 (43.5%)	57 (45.6%)	177 (53.2%)	14 (46.7%)
Post-graduate	362 (39.6%)	66 (28.0%)	62 (44.3%)	9 (33.3%)	12 (52.2%)	58 (46.4%)	145 (43.5%)	10 (33.3%)
Marital Status								
Single	627 (68.6%)	194 (82.2%)	108 (77.1%)	10 (37.0%)	17 (73.9%)	76 (60.8%)	199 (59.8%)	23 (76.7%)
Married	161 (17.6%)	28 (11.9%)	23 (16.4%)	9 (33.3%)	3 (13.0%)	19 (15.2%)	74 (22.2%)	5 (16.7%)
Married to a Korean	126 (13.8%)	14 (5.9%)	9 (6.4%)	8 (29.6%)	3 (13.0%)	30 (24.0%)	60 (18.0%)	2 (6.7%)
BMI								
<18.5 kg/m ²	24 (2.7%)	3 (1.3%)	13 (9.4%)	1 (3.7%)	0 (0.0%)	3 (2.4%)	4 (1.2%)	0 (0.0%)
18.5-24.9 kg/m ²	535 (59.3%)	151 (65.1%)	97 (69.8%)	9 (33.3%)	14 (60.9%)	81 (65.3%)	161 (49.2%)	22 (73.3%)
≥25 kg/m ²	348 (38.0%)	78 (33.6%)	29 (20.9%)	17 (63.0%)	9 (39.1%)	40 (32.3%)	162 (49.2%)	8 (26.7%)
Years in Korea								
<1	161 (17.6%)	34 (14.4%)	25 (17.9%)	5 (18.5%)	1 (4.3%)	33 (26.4%)	53 (15.9%)	10 (33.3%)
1-4	498 (54.5%)	171 (72.5%)	86 (61.4%)	7 (25.9%)	20 (87.0%)	56 (44.8%)	144 (43.2%)	14 (46.7%)
≥5	255 (27.9%)	31 (13.1%)	29 (20.7%)	15 (55.6%)	2 (8.7%)	36 (28.8%)	136 (40.8%)	6 (20.0%)

Column percent shown

ed: African (n=236), Asian (n=140), Australian (n=27), Middle Eastern (n=23), European (n=125), North American (n=333), and South American (n=30). The average age of the sample was 29.84 years, with African slightly younger (26.80 ± 5.41). The younger age of the sample is correlated with the marital status as 68.6 percent of the sample said to be single with only 17.6 percent married. The sample was composed of highly educated participants with only 6.8 percent saying that they have not completed a bachelor degree. While thirty-eight percent of the sample had a BMI ≥ 25 kg/m², almost half of the participants from North America were overweight or obese, an indication of overnutrition.

Bivariate Analyses

The association of level of Korean language proficiency with socio-demographic characteristics, BMI and self-reported hypertension is

shown in Table 2. Region of origin, years in Korea, marital status, age, gender and BMI were significantly associated with Korean language proficiency ($p < 0.0001$). The fluency in Korean language (very well) was mostly observed among participants from Asia (43.6%). This could be explained by the geography and the cultural similarity. On the other hand, participants who reported not speaking Korean well were mostly North Americans (63.4%), and married couples (not with a Korean) (65.2%). Most participants from North America came to Korea as English teachers. Thus, language acculturation is not a factor.

There was no significant association between Korean language proficiency and self-reported hypertension (Table 3). English speaking residents in Korea can have most services in English without the stress associated with learning a new language. Furthermore, most institutions in Korea, including government, higher

Table 2: Association of levels of Korean language proficiency among foreigners with socio-demographic variables, body mass index and hypertension

Characteristics	Korean language proficiency			P value <0.0001
	Not well/Not at all n=427 (46.7%)	Well n=310 (33.9%)	Very well n=177 (19.4%)	
<i>Region of Origin</i>				
Africa	82 (34.7)	88 (37.3)	66 (28.0)	
Asia	32 (22.9)	47 (33.6)	61 (43.6)	
Australia and Oceania	17 (63.0)	7 (25.9)	3 (11.1)	
Middle East	12 (52.2)	8 (34.8)	3 (13.0)	
Europe	68 (54.4)	37 (29.6)	20 (16.0)	
North America	211 (63.4)	105 (31.5)	17 (5.1)	
South America	5 (16.7)	18 (60.0)	7 (23.3)	
<i>Years in Korea</i>				<0.0001
<1	115 (71.4)	34 (21.1)	12 (7.5)	
1-4	214 (43.0)	172 (34.5)	112 (22.5)	
≥ 5	98 (38.4)	104 (40.8)	53 (20.8)	
<i>Marital Status</i>				<0.0001
Single	280 (44.7)	203 (32.4)	144 (23.0)	
Married	105 (65.2)	42 (26.1)	14 (8.7)	
Married to a Korean	42 (33.3)	65 (51.6)	19 (15.1)	
<i>Age (years)</i>				<0.0001
18-29	207 (39.2)	187 (35.4)	134 (25.4)	
30-39	151 (54.7)	89 (32.2)	36 (13.0)	
40-49	45 (60.0)	25 (33.3)	5 (6.7)	
≥ 50	22 (73.3)	8 (26.7)	0 (0.0)	
<i>Gender</i>				0.005
Female	241 (51.7)	138 (29.6)	87 (18.7)	
Male	186 (41.5)	172 (38.4)	90 (20.1)	
<i>Body Mass Index</i>				<0.0001
≤ 18.5 kg/m ²	11 (45.8)	2 (8.3)	11 (45.8)	
18.5-24.9 kg/m ²	216 (40.4)	199 (37.2)	120 (22.4)	
≥ 25 kg/m ²	193 (56.3)	106 (30.9)	44 (12.8)	

education centers, and roads all have instructions written in both Korean and English. However, the researcher observed an association between self-reported hypertension with years of residence in Korea, gender, age and BMI ($p \leq 0.001$). The duration of stay in a country has always been the main factor when measuring acculturation. With time, people age and adopt the host country habits (daily life and food choices). Thus, with integration comes health degradation over time. Table 3 also shows that gender (male, 16.8%, $p = 0.003$), age (40-49, 26.8%, $p \leq 0.0001$) and BMI ($\geq 25 \text{ kg/m}^2$, 19.6%, $p \leq 0.001$) were associated with self-reported hypertension. Finally, a strong association was found between

parental hypertension and self-reported hypertension ($p \leq 0.001$).

Multivariate Analyses

The final multivariate logistic regression model (Table 4) included region of origin, Korean language proficiency, years of residence in Korea, age, BMI, gender and parental hypertension. The final model showed the non-association of the region of origin and Korean language proficiency with self-reported hypertension. While language acculturation is often associated with health outcome, in Korea English speaking residents could receive medical treatment in English and most services. On the other hand,

Table 3: Effect of acculturation and other variables of interest on self-reported hypertension among foreigners

Characteristics	n (%)	Self-reported hypertension	No hypertension	P value
<i>Korean Proficiency</i>				0.458
Not Well/Not at All	391 (53.64)	50 (12.8)	341 (87.2)	
Well	223 (30.59)	32 (14.3)	191 (85.7)	
Very Well	115 (15.77)	11 (9.6)	104 (90.4)	
<i>Years in Korea</i>				<0.0001
<1	138 (18.5)	17 (12.3)	121 (87.7)	
1-4	367 (50.3)	31 (8.4)	336 (91.6)	
≥ 5	224 (30.7)	45 (20.1)	179 (79.9)	
<i>Region</i>				0.047
Africa	158 (21.7)	24 (15.2)	134 (84.8)	
Asia	93 (12.8)	9 (9.7)	84 (90.3)	
Australia	24 (3.3)	7 (29.2)	17 (70.8)	
Europe	105 (14.4)	8 (7.6)	97 (92.4)	
Middle East	16 (2.2)	0 (0.0)	16 (100.0)	
North America	312 (42.8)	43 (13.8)	269 (86.2)	
South America	21 (2.9)	2 (9.5)	19 (90.5)	
<i>Marital Status</i>				0.585
Single	475 (65.2)	58 (12.2)	417 (87.8)	
Married	151 (20.7)	23 (15.2)	128 (84.8)	
Married to a Korean	103 (14.1)	12 (11.7)	91 (88.3)	
<i>Education</i>				0.035
High School	47 (6.4)	4 (8.5)	43 (91.5)	
Bachelor	356 (48.8)	57 (16.0)	299 (84.0)	
Post-graduate	326 (44.7)	32 (9.8)	294 (90.2)	
<i>Gender</i>				0.003
Female	383 (52.5)	35 (9.1)	348 (90.9)	
Male	346 (47.5)	58 (16.8)	288 (83.2)	
<i>Age (years)</i>				<0.0001
18-29	383 (52.8)	34 (8.9)	349 (91.1)	
30-39	243 (33.5)	31 (12.8)	212 (87.2)	
40-49	71 (9.8)	19 (26.8)	52 (73.2)	
≥ 50	29 (4.0)	7 (24.1)	22 (75.9)	
<i>Body Mass Index</i>				<0.0001
<18.5 kg/m ²	21 (2.9)	1 (4.8)	20 (95.2)	
18.5-24.9 kg/m ²	408 (56.7)	34 (8.3)	374 (91.7)	
$\geq 25 \text{ kg/m}^2$	291 (40.4)	57 (19.6)	234 (80.4)	
<i>Parental Hypertension</i>				<0.0001
Yes	89 (13.4%)	79 (88.8)	368 (64.11)	
No	574 (86.6)	10 (11.2)	206 (35.89)	

Table 4: Multivariate adjusted odds ratio of self-reported hypertension among foreigners

Predictor variables	Adjusted OR (95% CI)	P value
<i>Region of Origin</i>		
Australia	Ref	
Africa	0.435 (0.163, 1.161)	0.096*
Asia	0.260 (0.085, 0.795)	0.18
Europe	0.200 (0.064, 0.625)	0.006 [‡]
North America	0.388 (0.152, 0.991)	0.048 [†]
South America	0.256 (0.047, 1.403)	0.116
<i>Korean Proficiency</i>		
Not well/not at all	Ref	
Well	1.143 (0.709, 1.842)	0.584
Very well	0.721 (0.362, 1.436)	0.353
<i>Years in Korea</i>		
<1	Ref	
1-4	0.657 (0.351, 1.229)	0.189
≥5	1.789 (0.978, 3.273)	0.059*
<i>Age (years)</i>		
18-29	Ref	
30-39	1.501 (0.896, 2.514)	0.123
40-49	3.751 (1.993, 7.060)	<0.0001 [§]
≥50	3.266 (1.301, 8.200)	0.012 [†]
<i>Body Mass Index</i>		
18.5-24.9 kg/m ²	Ref	
<18.5 kg/m ²	0.550 (0.072, 4.225)	0.565
≥25 kg/m ²	2.679 (1.700, 4.224)	<0.0001 [§]
<i>Gender</i>		
Male	Ref	
Female	0.499 (0.319, 0.781)	0.002 [§]
<i>Parental Hypertension</i>		
No	Ref	
Yes	4.422 (2.241, 8.726)	<0.0001 [§]

* $p \leq 0.10$; [†] $p \leq 0.05$; [‡] $p \leq 0.01$, [§] $p \leq 0.001$

those who have been residing in Korea for more than 5 years had 1.78 higher odds of self-reporting hypertension ($p=0.059$) than participants who have been living in Korea between 1 to 4 years (OR=0.657). This predictable outcome is a result of integration, the immigrant is adopting the host country culture. Also, participants with a BMI $\geq 25\text{kg/m}^2$ had higher odds of self-reporting hypertension (OR=2.67) than those with BMI $\leq 18.5\text{kg/m}^2$. The same correlation was observed regarding participants between the ages of 40 and 49 (OR=3.75) compared to the other age groups: 30-39 years old (OR=3.751) and over 50 (OR=3.266). Female participants had lower odds of self-reporting hypertension than men (OR=0.499). Finally, those who had a parent with hypertension had 4.42 higher odds of self-reporting hypertension.

DISCUSSION

Hypertension is widely acknowledged as the most common cardiovascular disorder often

associated with risk of stroke, coronary heart disease, renal failure and premature mortality (Li et al. 2017). The primary objective of this research was to investigate the association between acculturation variables (Korean language proficiency and duration of residence in Korea) and self-reported hypertension.

No correlation was found between Korean language proficiency and self-reported hypertension ($p=0.458$) (Table 3). However, participants who spoke Korean “very well” had lower odds of self-reporting hypertension (OR=0.721) than those who did “not speak well” (OR=1.143). While English is not an official language in Korea, language remains an important acculturation metric since Korean is the official language in Korea. This factor seems not to affect the English speaking participants on this study. This could be attributed to essential services offered in English such as healthcare, driving license, road maps, higher education, and other government services. Furthermore, English language is commonly used as a tool for advancement or survival in Korea (Nam 2005).

The odds of reporting hypertension was associated with duration of residence, a conclusion confirmed by other studies (Moran et al. 2007). Foreign-born participants residing in Korea for more than 5 years had higher odds of self-reporting hypertension (OR=1.789) than those residing in Korea for less than 5 years (1-4 years, OR=0.657, $p=0.189$) (Table 4). Acculturation, as measured by duration of residence in Korea, was an important predictor of hypertension. This suggests that acculturation may differentially impact foreign-born residents in Korea. These observations can be attributed to acculturative stress (Moran et al. 2007; Steffen et al. 2006; Vaeth and Willett 2005), xenophobic attitude (Jung 2012) or other unmeasured psychological and social factors. It could also be a normal process of integration in the host country as behavioral changes occurring upon migration may contribute to the development of hypertension.

Most studies conducted have established the association of BMI and the risk of hypertension (Dua et al. 2014; Li et al. 2017). The present study confirmed that foreign-born participants with a BMI $\geq 25\text{kg/m}^2$ showed higher odds (OR=2.68) of self-reporting hypertension compared to underweight participants (BMI $<18.5\text{kg/m}^2$) (OR=0.55) (Table 4). The risk of hypertension accelerated with the increase of BMI, which was similar with other studies (Lee et al.

2013; Li et al. 2017; O'Brien et al. 2014). This could be attributed to dietary change (Lee et al. 2013). However, reports do not associate Korean traditional food pattern with hypertension (Shin et al. 2013; Song and Lee 2014) despite its high salt content which is associated with hypertension (Ha 2014). It is therefore possible that most participants in the study were adopting western pattern diet or foods similar to what they are familiar with.

In this study, the researcher observed that women had lower odds of self-reporting hypertension ($OR=0.499$, $p=0.002$) than men (Table 4). The data from the present study showed that 45.3 percent of male participants were overweight/obese compared to women (31%). Since a higher BMI is associated with risk of developing hypertension, the higher prevalence of hypertension among men participants in this study could be associated with obesity. However, the impact of gender is a topic of active research and remains poorly clarified as contrary findings exist (Doulas et al. 2013; Ong et al. 2008).

The odds of self-reporting hypertension increased with age (Table 4). Younger participants (age 30-39) reported lower odds of hypertension ($OR=1.501$, $p=0.123$) compared to older participants (age 40-49) ($OR=3.751$, $p<0.0001$), which is in agreement with the findings of other researchers (Daugherty et al. 2011). Some reports associate the decrease in creatinine clearance with age leading to sodium retention and thus aggravating hypertension (Anderson 1999).

As for parental hypertension, the increase in risk of self-reporting hypertension among those whose parents also had hypertension has been reported (Goldstein et al. 2008; Wang et al. 2008). The present investigation showed higher odds of reporting hypertension by participants with family history of hypertension ($OR=4.42$, $p<0.0001$). While the risk of developing hypertension as a result of family history has not been well quantified, the risk is likely attributable to two factors: shared environmental exposures and genetic susceptibility.

CONCLUSION

The present study did not support a causal relationship between Korean language ability and hypertension. However, the duration of stay seemed to predict self-reported hypertension. In addition, control variables (body mass index,

gender, family history of hypertension) may be contributing factors for the higher prevalence of self-reported hypertension.

Korea has been composed of a single ethnic group with no experience of large scale immigration. The foreign-born population in Korea is growing and men are more likely to develop hypertension than women. An analysis of risk of hypertension along gender among foreign-born populations is encouraged. Disaggregated regions of original place of birth is needed to further explore the differences in health status of different communities present in Korea. The prevalence of hypertension in different regions and countries varies widely, with rates as low as 3.4 percent in rural Indian men and as high as 72.5 percent in Polish women.

RECOMMENDATIONS

While the prevalence of self-reporting hypertension in this study was 12.75 percent among foreign-born compared to Korean-born residents estimated at 22.2 percent, this may be due to the absence of known risk factors such as obesity, sedentary lifestyle, and dietary habits. This suggests that hypertension will soon become a major health issue. The researcher also observed that the prevalence of hypertension was higher among participants who were in the 40 to 49 age group and over 50 age group that is, 26.8 and 24.1 percent, respectively. Because it is estimated that hypertension is likely to rise to thirty percent by the year 2025, a multi-centric national study to gather baseline information on the status of hypertension is necessary among foreign-born residents in Korea.

LIMITATIONS

This study had some limitations. The majority of participants were well educated, which limits its generalization. Data on hypertension are self-reported, which may be subject to recall bias. However, self-reported data of hypertension have been shown to be highly correlated with medical doctors' records. Hence, persons with hypertension are probably more likely than those without hypertension to know if their parents had hypertension. The study did not distinguish between pre- and post-migration diagnosis of hypertension by a medical doctor. Since self-reported hypertension was associated with du-

ration of stay in Korea, measuring pre- and post-migration hypertension by a medical doctor would give a more accurate association. The study did not investigate the dietary habits of the participants, it is likely that the newcomers will eat more foods with which they are familiar or foods rich in fat and sugar; contributing in the process to weight gain and consequently to the risk of developing hypertension. Another factor could be the reasons to migrate to Korea. Gauging the impact of duration of residence on hypertension, many confounding factors such as genetics, nutrition, social and economic situation of individuals in relation to hypertension can be involved. Finally, individuals who were born outside of Korea, but grew up in Korea were excluded in the study.

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REFERENCES

- Alegria M 2009. The challenge of acculturation measures: What are we missing? A commentary on Thomson and Hoffman-Goetz. *Soc Sci Med*, 69(7): 996-998.
- Anderson GH 1999. Effect of age on hypertension: Analysis of over 4,800 referred hypertensive patients. *Saudi J Kidney Dis Transpl*, 10(3): 286-297.
- Commodore-Mensah Y, Ukonu N, Cooper LA, Agyemang C, Himmelfarb CD 2017. The association between acculturation and cardiovascular disease risk in Ghanaian and Nigerian-born African immigrants in the United States: The Afro-cardiac study. *J Immigr Minor Health*, Doi: 10.1007/s10903-017-0644-y.
- Daugherty SL, Masoudi FA, Ellis JL, Ho PM, Schmittiel JA et al. 2011. Age-dependent gender differences in hypertension management. *J Hypertens*, 29(5): 1005-1011.
- Deo MG, Pawar PV, Kanetkar SR, Kakade SV 2017. Prevalence and risk factors of hypertension and diabetes in the Katkari tribe of coastal Maharashtra. *J Postgrad Med*, 63(2): 106-113.
- Doumas M, Papademetriou V, Faselis C, Kokkinos P 2013. Gender differences in hypertension: Myths and reality. *Curr Hypertens Rep*, 15(4): 321-330.
- Dua S, Bhuker M, Sharma P, Dhall M, Kapoor S 2014. Body mass index relates to blood pressure among adults. *North American Journal of Medical Sciences*, 6(2): 89-95.
- Eamranond PP, Legedza ATR, Diez-Roux AV, Kandula NR, Palmas W et al. 2009. Association between language and risk factor levels among hispanic adults with hypertension, hypercholesterolemia, or diabetes. *American Heart Journal*, 157(1): 53-59.
- Goldstein IB, Shapiro D, Weiss RE 2008. How family history and risk factors for hypertension relate to ambulatory blood pressure in healthy adults. *J Hypertens*, 26(2): 276-283.
- Ha SK 2014. Dietary salt intake and hypertension. *Electrolyte Blood Press*, 12(1): 7-18.
- Hamrahan SM 2017. Management of hypertension in patients with chronic kidney disease. *Curr Hypertens Rep*, 19(5): 43.
- He FJ, Campbell NR, MacGregor GA 2012. Reducing salt intake to prevent hypertension and cardiovascular disease. *Rev Panam Salud Publica*, 32(4): 293-300.
- Jin K, Neubeck L, Gullick J, Koo F, Ding D 2017. Acculturation is associated with higher prevalence of cardiovascular disease risk factors in Chinese immigrants in Australia: Evidence from a large Australian cohort. *Heart, Lung and Circulation*, 26(Suppl 2): S48-S49.
- Jung IJ 2012. A new wonderland of Asian migration: Does symbolic politics trump utilitarian politics? *International Area Studies Review*, 15: 43-58.
- Kim J, Heo J, Park SH 2014. The exploration of acculturation and health among immigrants from non-eastern cultures. *Qualitative Health Research*, 24(8): 1138-1149.
- Lamar M, Wu D, Durazo-Arvizu RA, Brickman AM, Gonzalez HM et al. 2017. Cognitive associates of current and more intensive control of hypertension: Findings From the hispanic community health study/study of latinos. *Am J Hypertens*, 30(6): 624-631.
- Lee JH, Yang DH, Park HS, Cho Y, Jun JE et al. 2011. Incidence of hypertension in Korea: 5-year follow-up study. *Journal of Korean Medical Science*, 26(10): 1286-1292.
- Lee S, O'Neill AH, Ihara ES, Chae DH 2013. Change in self-reported health status among immigrants in the United States: Associations with measures of acculturation. *PLoS One*, 8(10): e76494.
- Li W, Wang D, Wu C, Shi O, Zhou Y et al. 2017. The effect of body mass index and physical activity on hypertension among Chinese middle-aged and older population. *Scientific Reports*, 7(1): 10256.
- Moon S-J, Kim CS, Kim TW 2014. Chinese immigrants in Korea: The relationship between interpersonal communication and acculturation. *Asian and Pacific Migration Journal*, 23(3): 279.
- Moran A, Diez Roux AV, Jackson SA, Kramer H, Manolio TA et al. 2007. Acculturation is associated with hypertension in a multiethnic sample. *Am J Hypertens*, 20(4): 354-363.
- Nam JM 2005. The changing role of English in Korea: From English as a tool for advancement to English for survival. *Pan-Pacific Association of Applied Linguistic*, 9(2): 227-240.
- Nguyen HH, Smith C, Reynolds GL, Freshman B 2015. The effect of acculturation on obesity among foreign-born Asians residing in the United States. *J Immigr Minor Health*, 17(2): 389-399.

- O'Brien MJ, Alos VA, Davey A, Bueno A, Whitaker RC 2014. Acculturation and the prevalence of diabetes in US Latino adults, National health and nutrition examination survey 2007-2010. *Prev Chronic Dis*, 11: E176.
- Obiang-Obounou BW 2015. Dietary acculturation of foreign students in Daegu, Korea. *J Hum Nutr Food Sci*, 3(4): 1068-1076.
- Okafor MT, Carter-Pokras OD, Picot SJ, Zhan M 2013. The relationship of language acculturation (English proficiency) to current self-rated health among African immigrant adults. *J Immigr Minor Health*, 15(3): 499-509.
- Ong KL, Tso AW, Lam KS, Cheung BM 2008. Gender difference in blood pressure control and cardiovascular risk factors in Americans with diagnosed hypertension. *Hypertension*, 51(4): 1142-1148.
- Rodriguez F, Hicks LS, López L 2012. Association of acculturation and country of origin with self-reported hypertension and diabetes in a heterogeneous hispanic population. *BMC Public Health*, 12(1): 768.
- Rosenthal T 2014. The effect of migration on hypertension and other cardiovascular risk factors: A review. *J Am Soc Hypertens*, 8(3): 171-191.
- Satia-Abouta J 2003. Dietary acculturation: Definition, process, assessment, and implication. *International Journal of Human Ecology*, 4(1): 71-86.
- Shin JY, Kim JM, Kim Y 2013. Associations between dietary patterns and hypertension among Korean adults: The Korean national health and nutrition examination survey (2008-2010). *Nutr Res Pract*, 7(3): 224-232.
- Song HJ, Lee HJ 2014. Consumption of kimchi, a salt fermented vegetable, is not associated with hypertension prevalence. *Journal of Ethnic Foods*, 1(1): 8-12.
- Steffen PR, Smith TB, Larson M, Butler L 2006. Acculturation to western society as a risk factor for high blood pressure: A meta-analytic review. *Psychosom Med*, 68(3): 386-397.
- Unknown 2016. Test of Proficiency in Korean. From <<http://www.topikguide.com/topik-overview/>> (Retrieved on 12 February 2015).
- Vaeth PA, Willett DL 2005. Level of acculturation and hypertension among Dallas County hispanics: Findings from the Dallas heart study. *Ann Epidemiol*, 15(5): 373-380.
- Wang NY, Young JH, Meoni LA, Ford DE, Erlinger TP et al. 2008. Blood pressure change and risk of hypertension associated with parental hypertension: The Johns Hopkins precursors study. *Arch Intern Med*, 168(6): 643-648.
- WHO Expert Committee on Physical Status: The Use and Interpretation of Anthropometry 1995. *Physical Status : The Use and Interpretation of Anthropometry: Report of a WHO Expert Committee*. Geneva: World Health Organization.
- Wilkinson AV, Spitz MR, Strom SS, Prokhorov AV, Barcnas CH et al. 2005. Effects of nativity, age at migration, and acculturation on smoking among adult Houston residents of Mexican descent. *Am J Public Health*, 95(6): 1043-1049.
- World Health Organization 2000. *Obesity: Preventing and Managing the Global Epidemic*. Geneva: World Health Organization.

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